FLOOD INSURANCE STUDY

VILLAGE OF GARRETTSVILLE, OHIO

PORTAGE COUNTY

MARCH 5, 1990

Federal Emergency Management Agency

COMMUNITY NUMBER - 390455

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

VILLAGE OF GARRETTSVILLE,
PORTAGE COUNTY,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Garrettsville, Portage County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Buffalo District (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-87-E-2509, Project Order No. 25. This study was completed in May 1988.

1.3 Coordination

On May 7, 1987, an initial coordination meeting was held with representatives from FEMA, the Ohio Department of Natural Resources (ODNR), and the Study Contractor.

A news article announcing intent to perform a Flood Insurance Study for the Village of Garrettsville was published in the Record Courier, Ravenna, Ohio. The announcement encouraged those with any relevant facts and technical data concerning local flood hazards to provide the information to the Garrettsville Zoning Inspector who, in turn, forwarded the information to the Study Contractor.

The COE also sent letters to the U.S. Department of Agriculture Soil Conservation Service, U.S. Geological Survey Water Resources Division, ODNR, and Portage County requesting technical data that would be useful in conducting the Flood Insurance Study for the Village of Garrettsville.

On April 26, 1989, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Garrettsville, Portage County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Eagle Creek and Camp Creek was studied in detail.

Areas having low development potential or minimal flood hazards were previously studied using approximate analyses. The results were shown on the Flood Hazard Boundary Map for the Village of Garrettsville (Reference 1) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through May 1993. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Garrettsville.

2.2 Community Description

The Village of Garrettsville is in northeastern Portage County in northeastern Ohio, and incorporates 2.25 square miles. It is surrounded by the unincorporated areas of Portage County. The village is served by State Routes 82 and 88. The 1980 population of Garrettsville was reported to be 1,769 (Reference 2).

The climate of Garrettsville is continental, characterized by moderate differences in temperature and precipitation. The average annual precipitation is 40.88 inches; the average annual snowfall is 60.9 inches. The maximum recorded temperature at the nearest climatological data station was 102 degrees Fahrenheit (^{o}F), recorded in September 1953; a minimum of -23^{o}F was recorded in January 1963. The maximum 24-hour rainfall was 5 inches, recorded on September 17, 1972, and the maximum 24-hour snowfall was 21 inches, recorded on March 2, 1963 (Reference 3).

2.3 Principal Flood Problems

Generally, the most widespread flooding occurs from December to April, with most flooding resulting from heavy rain and snowmelt. Major obstructions to floodflow include trees, brush, and other streambank vegetation. Because most of the county is rural, flood events are not well documented. However, flooding has been recorded on Eagle Creek downstream of Garrettsville in Trumbull County. The highest flood of record for that area of Eagle Creek occurred in January 1959 and had a recurrence interval of approximately 100 years (Reference 4). The most

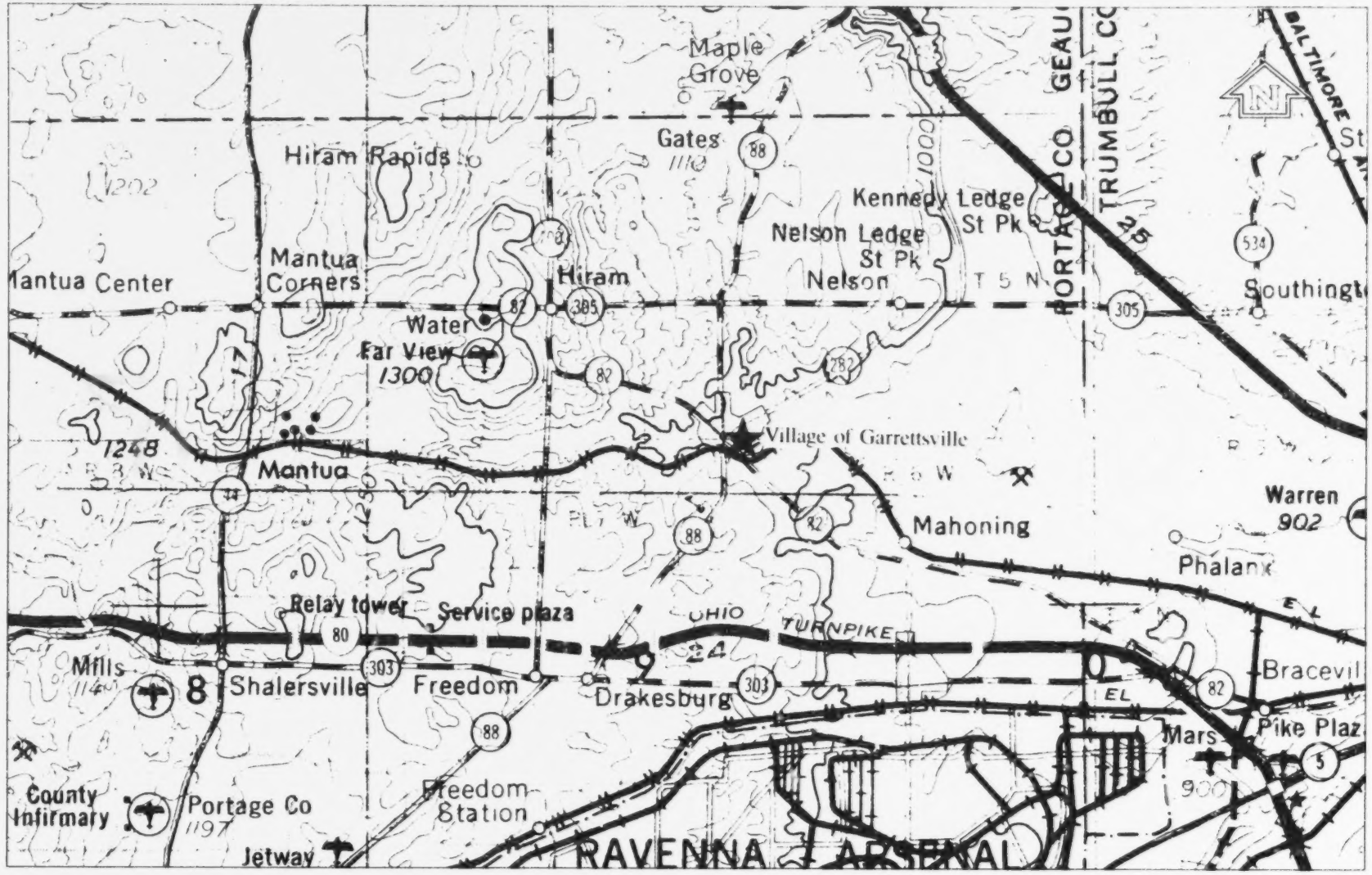


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF GARRETTSVILLE, OH

(PORTAGE CO.)

APPROXIMATE SCALE

2 0 2 4 6 MILES

VICINITY MAP

recent flood was in September 1979, with flood heights approximately equal to those of the 1959 flood.

2.4 Flood Protection Measures

Although there are some drop structures within the Village of Garrettsville and the surrounding communities, they do not provide the community with protection against major events such as the 100-year flood.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Peak discharges were calculated using procedures from ODNR Bulletin No. 45 (Reference 5), which provides regression equations that are used to estimate peak discharges based on watershed characteristics (e.g., drainage area, channel slope, percent ponded area). Using those regression equations and basin characteristics determined from topographic maps (Reference 6), the 100-year peak discharges for the studied streams were determined.

Peak discharge-drainage area relationships for the 100-year flood of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR
EAGLE CREEK		
at eastern corporate limits	29.8	3,550
at confluence of Camp Creek	26.2	3,450
CAMP CREEK		
at mouth	3.44	660
about 0.75 mile upstream of mouth	2.85	560

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data for the hydraulic analyses were obtained from topographic maps (Reference 6) and field survey. Underwater sections and overbank elevations adjacent to the streams were also obtained by field survey. All bridges and dams were surveyed to obtain elevation and structural geometry data.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

There are two concrete drop structures located within Garrettsville. One, on Eagle Creek about 200 feet upstream of the Windham Street bridge, has a drop of 18 feet; the other, on Camp Creek at the Liberty Street bridge, has a drop of 17.5 feet. At both drop structures, the water-surface profiles reach critical depth.

Water-surface elevations for the 100-year flood were computed using the HEC-2 step-backwater computer program (Reference 7). Starting water-surface elevations for Eagle and Camp Creeks were determined using critical depth.

Roughness coefficients (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observation of the stream and floodplain areas. The channel "n" values ranged from 0.02 to 0.03 for Eagle Creek and from 0.025 to 0.03 for Camp Creek. The overbank "n" values for both Eagle and Camp Creeks ranged from 0.04 to 0.065.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 6).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Hazard Boundary Map for the Village of Garrettsville, Ohio (Reference 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment

so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodways for Eagle Creek and Camp Creek lie outside the corporate limits.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

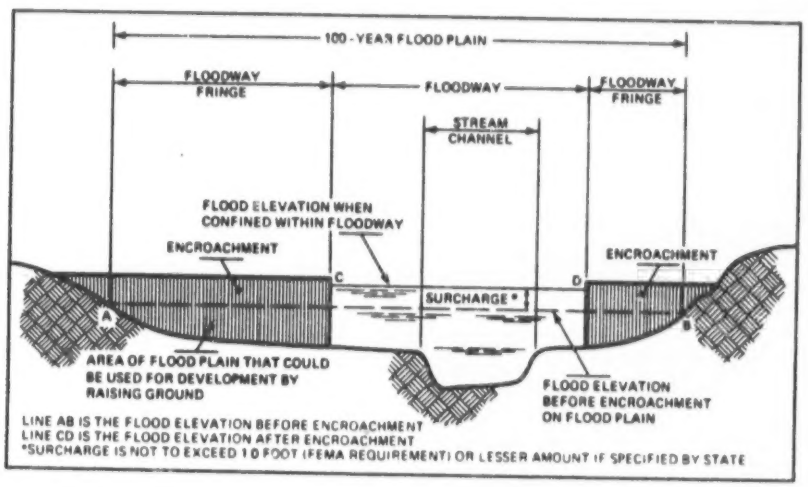

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
CAMP CREEK								
A	2020	60	172	3.8	951.8	951.8	951.8	0.0
B	2900	60	365	1.8	970.2	970.2	970.2	0.0
C	4200	30	212	3.1	970.7	970.7	970.7	0.0
D	6340	25	61	9.1	973.3	973.3	973.3	0.0
E	6950	55	201	2.8	974.7	974.7	975.7	1.0
EAGLE CREEK								
A	1790[2]	87	454	7.6	950.4	950.4	950.8	0.4
B	3420[2]	79	671	5.1	957.7	957.7	957.7	0.0
C	5020[2]	91	322	10.7	958.6	958.6	958.6	0.0
D	6153[2]	53	332	10.4	963.8	963.8	963.8	0.0
E	6931[2]	100	925	3.7	985.3	985.3	985.3	0.0
F	8680[2]	155	1008	3.4	986.0	986.0	986.0	0.0

[1]FEET ABOVE MOUTH
[2]FEET ABOVE BROSIUS ROAD

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF GARRETSVILLE, OH
(PORTAGE CO.)

FLOODWAY DATA

CAMP CREEK—EAGLE CREEK

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The Flood Insurance Rate Map printed for Portage County, Ohio (Reference 8) is in agreement with this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Village of Garrettsville (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the map repository of flood hazard data located in the community.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Village of Garrettsville, Portage County, Ohio, April 1976.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., February 1982.

3. ————, National Oceanic and Atmospheric Administration, Climates of the States, Washington, D.C., 1980.

4. U.S. Army Corps of Engineers, Pittsburgh District, Special Flood Hazard Information Report, Eagle Creek, Trumbull County, Ohio, June 1975.

5. Ohio Department of Natural Resources, Division of Water, Bulletin No. 45, Floods in Ohio, Magnitude and Frequency, Columbus, Ohio, May 1977.

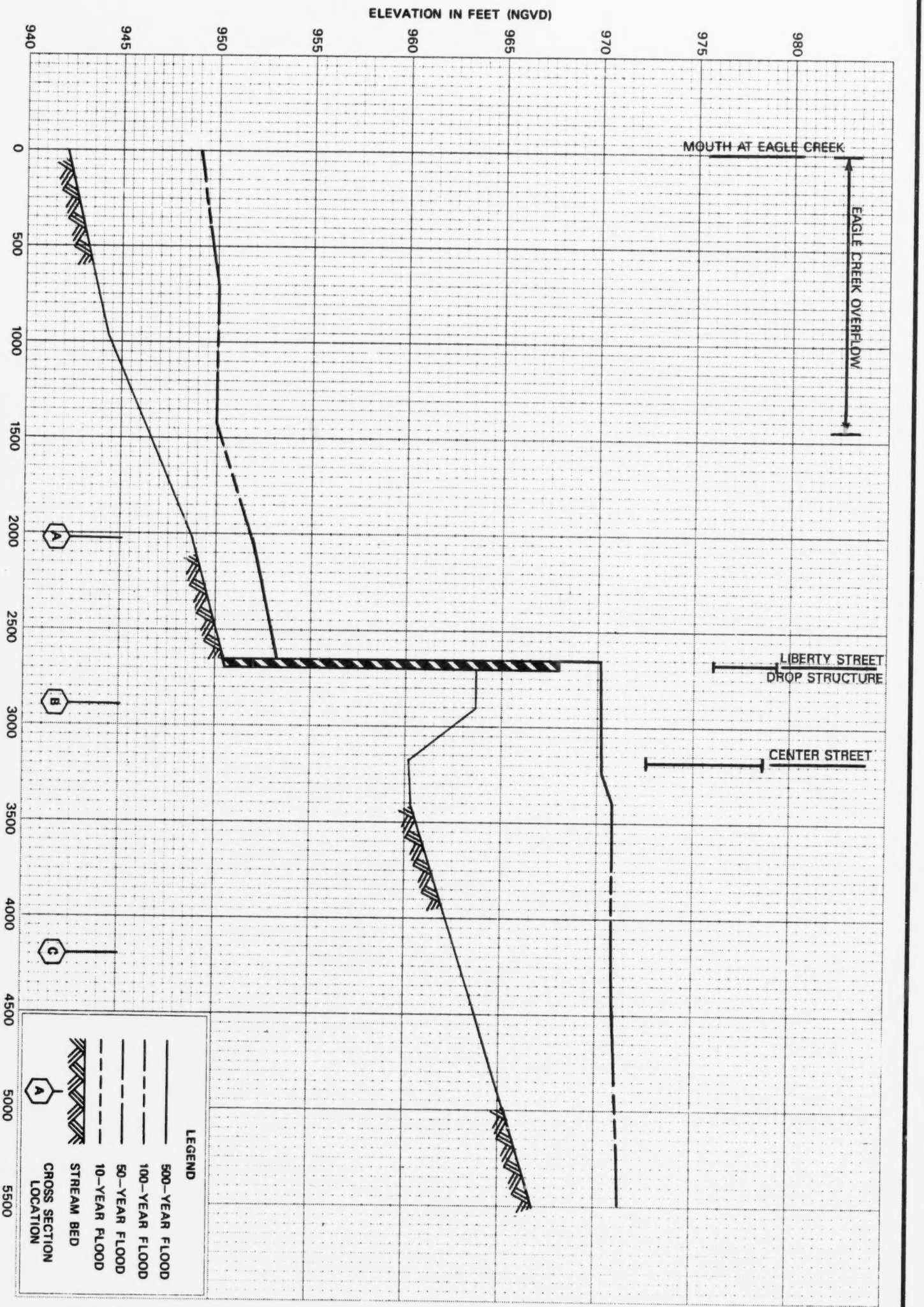
6. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 Feet: Garrettsville, Ohio, 1959, photorevised 1979.

7. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

8. Federal Emergency Management Agency, Flood Insurance Rate Map, Portage County, Unincorporated Areas, Ohio, September 1987.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	964.17	chiseled square painted yellow on lower step of northwest abutment of Liberty Street bridge over Eagle Creek
2	0001	979.00	chiseled square painted yellow at end of roadside corner of southwest wingwall of Liberty Street bridge over Camp Creek
3	0001	978.40	chiseled square painted yellow at roadside corner of northwest headwall of Center Street bridge over Camp Creek
4	0001	998.85	chiseled square painted yellow on top southeast corner of southwest light standard at Windham Street bridge over Eagle Creek
5	0001	989.77	chiseled square painted yellow on southwest abutment of South Street bridge over Eagle Creek
6	0001	991.93	chiseled square on northeast abutment of removed bridge over Eagle Creek, at southeast end of Forest Street



01P

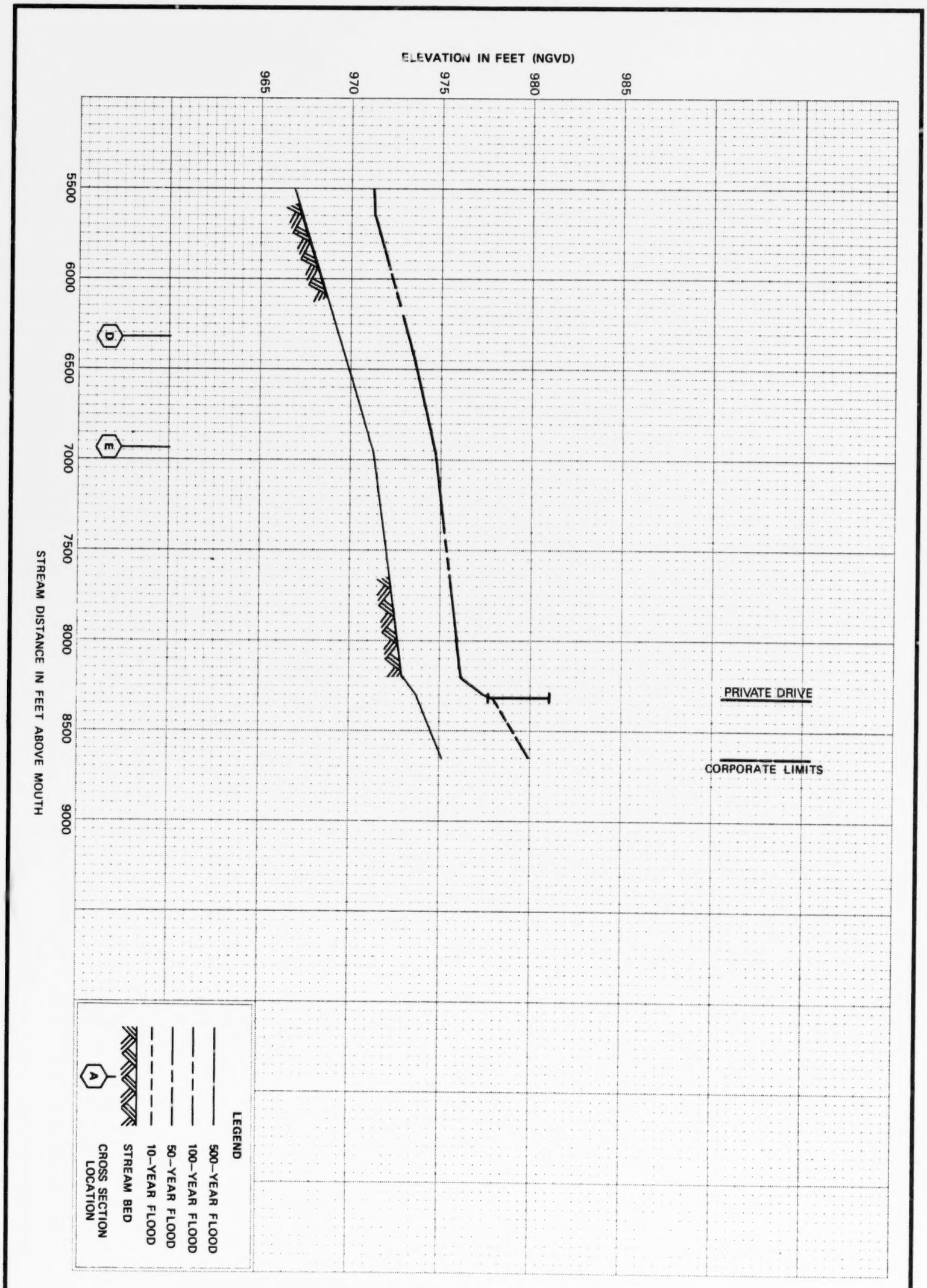
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF GARRETSVILLE, OH

(PORTAGE CO.)

FLOOD PROFILES

CAMP CREEK



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02P

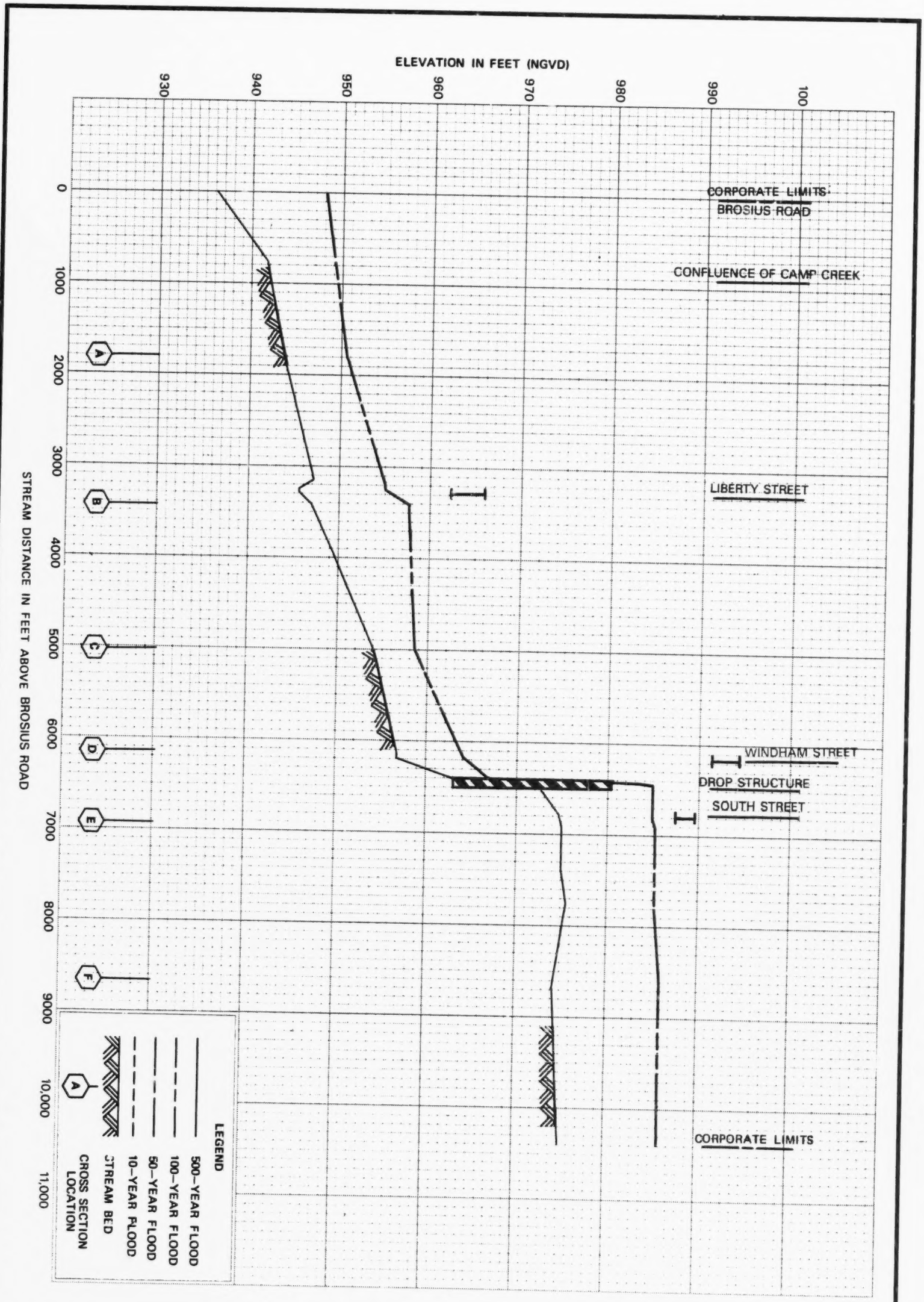
FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF GARRETSVILLE, OH

(PORTAGE CO.)

FLOOD PROFILES

CAMP CREEK



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FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF GARRETSVILLE, OH

(PORTAGE CO.)

FLOOD PROFILES

EAGLE CREEK